LABORATORIES INC.
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TEKTRONIX®

P6063A

PASSIVE PROBE

INSTRUCTION MANUAL

WARRANTY

All TEKTRONIX instruments are warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your TEKTRONIX Field Engineer or representative.

All requests for repairs and replacement parts should be directed to the TEKTRONIX Field Office or representative in your area. This will assure you the fastest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests for parts or service.

Specifications and price change privileges reserved.

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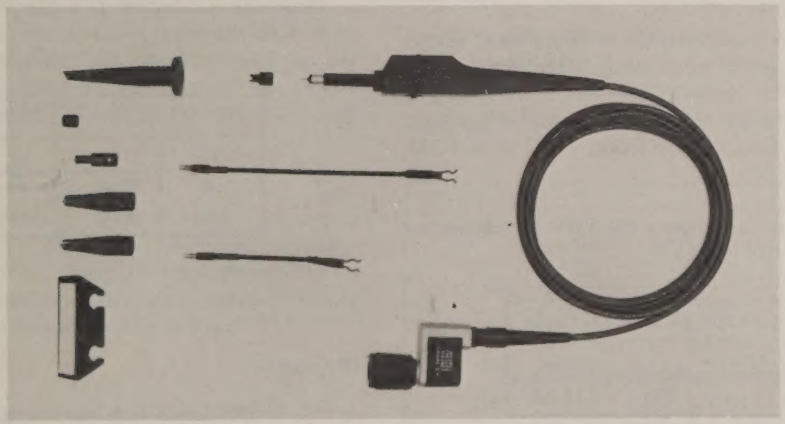
070-1672-00

First Printing JUN 1974

P6063A PASSIVE PROBE

SEL



The P6063A Probe is a selectable 1X or 10X passive probe for use with dc to 225 MHz oscilloscopes that have a 15- to 24-pF input capacitance and a 1 MΩ input resistance.

A ground-reference push button provides a ground-reference signal at either 1X or 10X attenuation. This feature can also be used to determine which trace of a multitrace display includes the signal from the probe. With a readout oscilloscope, the volts/division readout is electrically corrected to include the probe attenuation when the probe slide switch is set to the 10X position.

Adjustable frequency compensation is provided in the compensation box to match the probe to the oscilloscope input.

SPECIFICATIONS

Electrical

Attenuation: Same as oscilloscope in 1X position, within 3% in 10X position (oscilloscope input, 1 MΩ within 2%).

Input Resistance: Same as oscilloscope in 1X position. 10 MΩ within 0.5% (oscilloscope input, 1 MΩ within 2%) in 10X position.

Approximate Input Capacitance (With Probe Connected and Compensated in 10X Position):

3.5′ (1.1 m) Probe		6′ (1.8 m) Probe	
1X	10X	1X	10X
80 pF	11 pF	105 pF	14 pF

Compensation Range: 15 pF to 24 pF.

Maximum Input Voltage: 500 V (dc + peak ac) to 850 kHz derated to 70 V at 10 MHz in 1X position. 500 V (dc + peak ac) to 4.5 MHz derated to 30 V at 200 MHz in 10X position. See Fig. 1.

Minimum Bandwidth (−3 dB) (With Probe Compensated in 10X Position):

3.5′ (1.1 m) Probe		6′ (1.8 m) Probe	
1X	10X	1X	10X
8 MHz	200 MHz	6 MHz	200 MHz

Physical

Net Weight (including accessories): 3.5 foot (1.1 meter) probe: 4.5 oz. (128 grams); 6 foot (1.8 meter) probe: 5.0 oz. (145 grams)

Cable Length: Nominally 3.5 ft (1.1 meters), 6 ft (1.8 meters)

OPERATING CONSIDERATIONS

Circuit Loading

1X Switch Position. This position loads a circuit more than does the 10X position. The test point will see the oscilloscope input impedance (1 MΩ and 15 to 24 pF) paralleled by the capacitance of the probe cable and compensation network.

10X Switch Position. Although the probe dc input resistance is 10 MΩ, it can load a high-impedance circuit and distort the test signal. Therefore, when possible, select low-impedance test points. Also, as signal frequency increases, probe input impedance decreases, which increases the loading effect of the probe (see Fig. 1, 2, and 3).

Probe Grounding

A passive probe is a capacitive divider for high-frequency components. Inductance introduced by a long signal or ground lead will form a series resonant circuit that will "ring" if driven by a signal containing significant frequency components at or above circuit resonance. These oscillations can appear on the oscilloscope display and distort the true waveform. Ground leads and probe tip connections should be kept as short as possible to maintain the best fidelity.

Ground Reference

When the Ground Reference push button switch is pressed with the slide switch in the 1X attenuation position, the probe attenuation changes to 10X. Thus, the test signal is grounded through the probe 9 MΩ resistor.

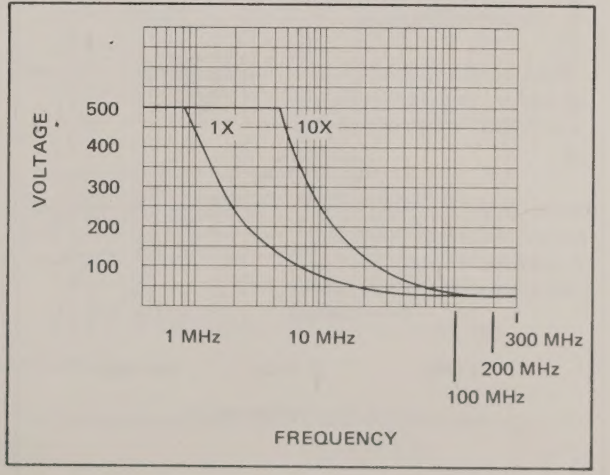


Fig. 1. Input voltage vs. frequency.

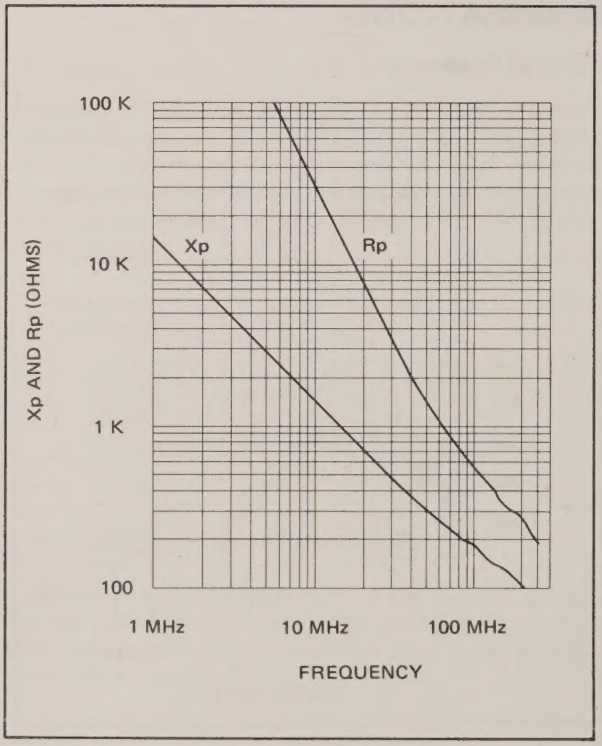


Fig. 2. Typical parallel reactance (X_p) and resistance (R_p) vs. frequency for 3.5 foot (1.1 meter) probe.

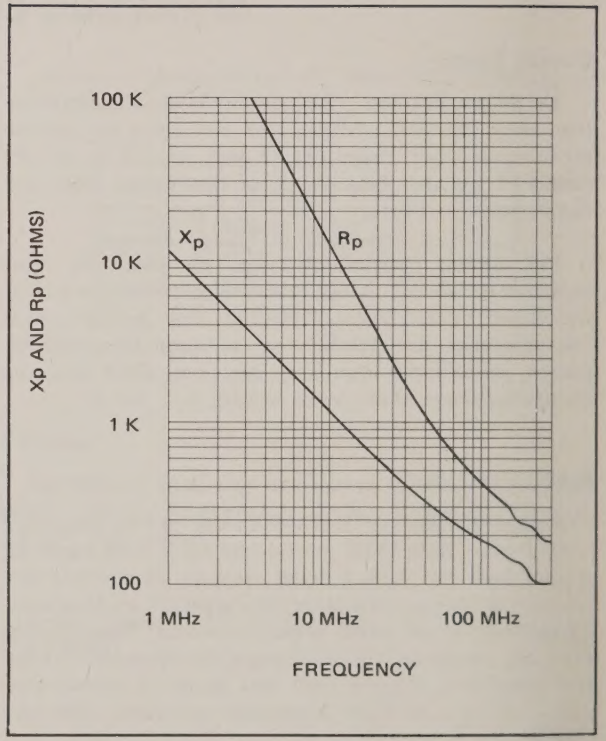


Fig. 3. Typical parallel reactance (X_p) and resistance (R_p) vs. frequency for 6 foot (1.8 meter) probe.

PROBE COMPENSATION

If the probe is transferred from one instrument or input channel to another, the low-frequency compensation will usually require readjustment. If the probe is to be used in observing or measuring sine-waves or pulses with frequency components above about 3 MHz, high-frequency compensation should be checked and adjusted as necessary.

TEST EQUIPMENT REQUIRED

DESCRIPTION	MINIMUM SPECIFICATIONS	USAGE	APPLICABLE TEST EQUIPMENT
Test oscilloscope	Bandwidth: 225 MHz	Frequency compensation	TEKTRONIX 585 or 7904 Oscilloscope with 7A16A Amplifier and a 7B70 Time Base.
Pulse or squarewave generator	Risetime: $\leqslant$ 1 ns Amplitude: 0.5 V into 50 Ω	High frequency compensation	TEKTRONIX PG506 Calibration Generator (operates in a TM 500 Power Module) or a Tektronix 106 Squarewave Generator.
USED WITH PG506 ONLY			
Coaxial cable with BNC connectors	Precision 50 Ω	High frequency compensation	TEKTRONIX part no. 012-0482-00

TEST EQUIPMENT REQUIRED (cont.)

DESCRIPTION	MINIMUM SPECIFICATIONS	USAGE	APPLICABLE TEST EQUIPMENT
10X attenuator with BNC connectors	50 Ω	High frequency compensation	TEKTRONIX part no. 011-0059-02.
Thru-line termination with BNC connectors	50 Ω	High frequency compensation	TEKTRONIX part no. 011-0049-01.
Probe tip-to-BNC adapter		High frequency compensation	TEKTRONIX part no. 013-0084-01.
USED WITH 106 ONLY			
Coaxial cable with GR connectors	5 ns, 50 Ω type RG213/U	High frequency compensation	TEKTRONIX part no. 017-0502-00.
10X attenuator with GR connectors	50 Ω	High frequency compensation	TEKTRONIX part no. 017-0078-00.
Thru-line termination with GR-to-BNC male connectors	50 Ω	High frequency compensation	TEKTRONIX part no. 017-0083-00.
Probe tip-to-GR adapter termination	50 Ω	High frequency compensation	TEKTRONIX part no. 017-0088-00.

Preliminary Procedure

1. Install P6063A Probe onto test oscilloscope input connector.

2. Turn test oscilloscope and associated test equipment power on and allow enough warmup time for equipment to stabilize.

3. Set test oscilloscope Volts/Div to 1 V or (10 mV), the Time/Div to 1 ms, and Calibrator for 5 V (or 0.4 V) 1 kHz signal.

Low-Frequency Compensation

1. Connect probe tip to test oscilloscope calibrator output.

2. Set test oscilloscope triggering controls for stable triggered display. Display should be approximately 10 cycles of square wave with an amplitude of 5 (or 4) divisions.

3. Adjust low-frequency compensation (C8, see Fig. 3) for optimum flat top on square wave.

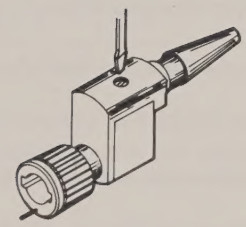


Fig. 3. Low-frequency adjustment.

High-Frequency Compensation

1. Disconnect P6063A Probe from test oscilloscope.

2. Connect positive rise (fast rise) output of generator through a 50 Ω cable, a 10X attenuator, and a 50 Ω thru-line termination to test oscilloscope input connector.

3. Set generator period (repetition rate) switch to 100 kHz.

4. Set test oscilloscope Time/Div to 0.02 μs and Volts/Div to 10 mV.

5. Adjust Amplitude control for 5 division pulse amplitude.

High-Frequency Compensation (cont)

6. Note pulse shape and aberrations.

7. Remove 50 Ω cable, 10X attenuator, and termination from generator and test oscilloscope. Install P6063A Probe on test oscilloscope input connector.

8. Connect probe tip to positive rise (fast rise) output of generator, using probe tip-to-BNC Adapter.

9. Check high-frequency response by comparing probe/oscilloscope pulse response against display noted in step 6. Aberrations from reference response should not exceed +3%, −3%, or 4% P-P of pulse amplitude.

10. If aberrations are excessive, proceed as follows:

a. Remove compensation box cover.

b. Adjust R5 and R6 (also R9 for 6-ft probe) for best overall flat response. See Fig. 4 for adjustment locations.

c. Adjust C6 for best corner response (without ringing).

d. Repeat step b. and c. as necessary for best waveform.

e. Recheck waveform with compensation box cover installed. Perform adjustments as necessary to obtain correct waveform with cover installed.

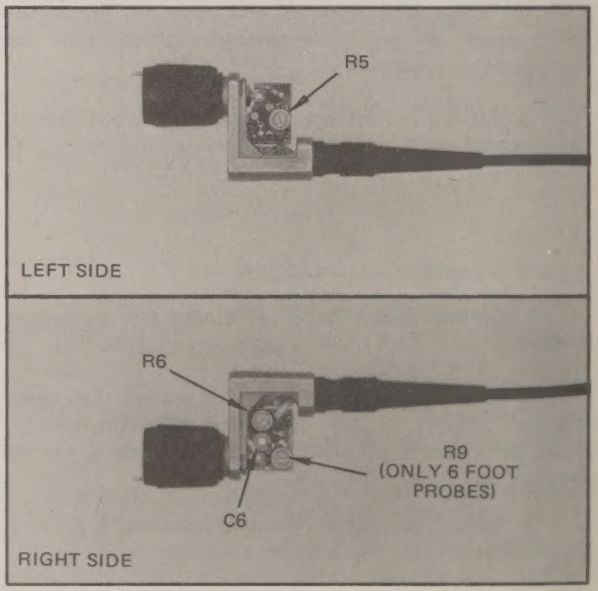
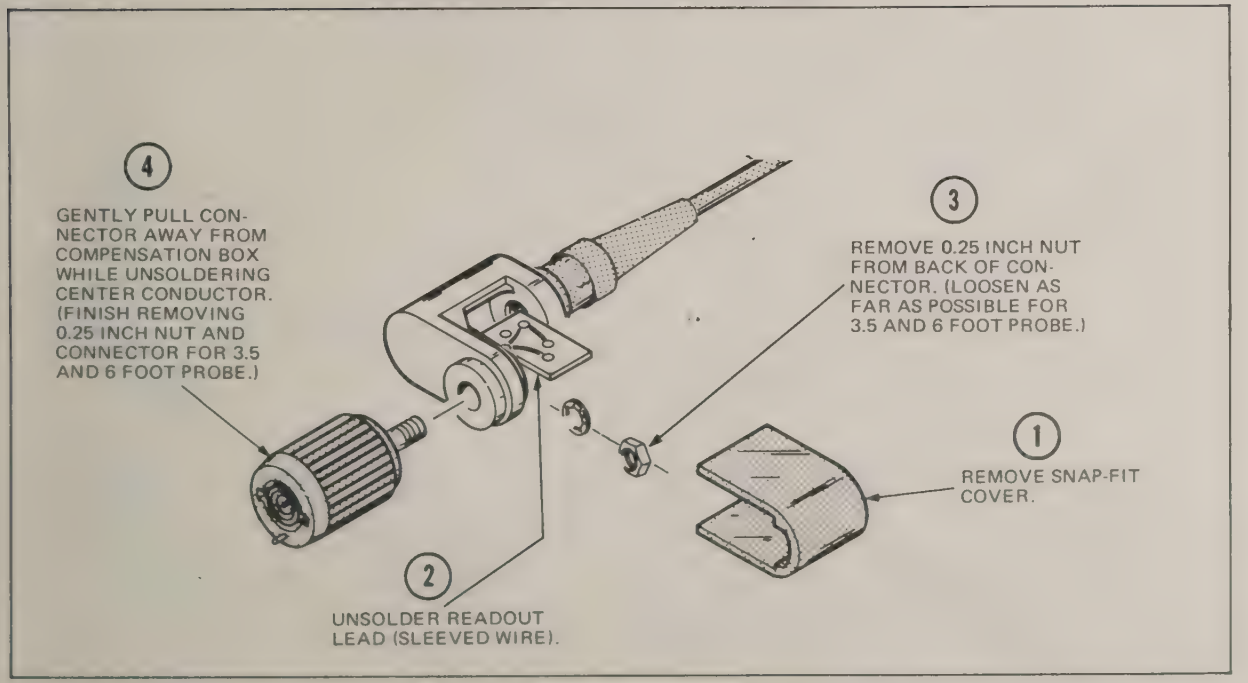
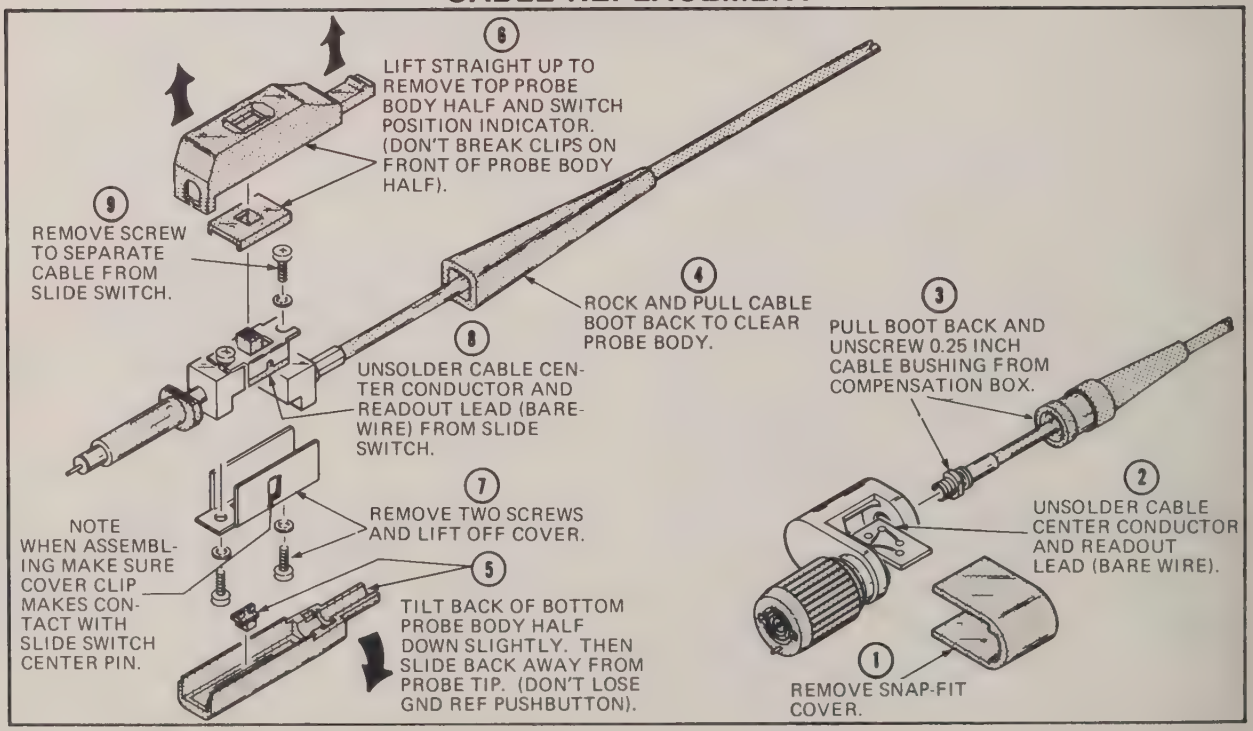


Fig. 4. High-frequency adjustments.

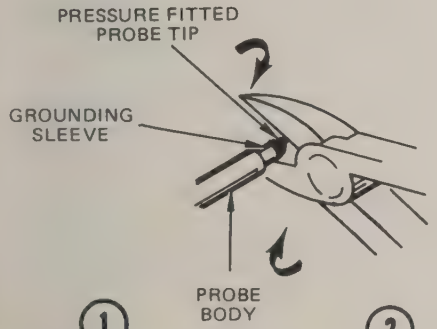
CONNECTOR REPLACEMENT


4
GENTLY PULL CONNECTOR AWAY FROM COMPENSATION BOX WHILE UNSOLDERING CENTER CONDUCTOR. (FINISH REMOVING 0.25 INCH NUT AND CONNECTOR FOR 3.5 AND 6 FOOT PROBE.)
3
REMOVE 0.25 INCH NUT FROM BACK OF CONNECTOR. (LOOSEN AS FAR AS POSSIBLE FOR 3.5 AND 6 FOOT PROBE.)
1
REMOVE SNAP-FIT COVER.
2
UNSOLDER READOUT LEAD (SLEEVED WIRE).

CABLE REPLACEMENT


6
LIFT STRAIGHT UP TO REMOVE TOP PROBE BODY HALF AND SWITCH POSITION INDICATOR. (DON'T BREAK CLIPS ON FRONT OF PROBE BODY HALF).
9
REMOVE SCREW TO SEPARATE CABLE FROM SLIDE SWITCH.
4
ROCK AND PULL CABLE BOOT BACK TO CLEAR PROBE BODY.
3
PULL BOOT BACK AND UNSCREW 0.25 INCH CABLE BUSHING FROM COMPENSATION BOX.
8
UNSOLDER CABLE CENTER CONDUCTOR AND READOUT LEAD (BARE-WIRE) FROM SLIDE SWITCH.
2
UNSOLDER CABLE CENTER CONDUCTOR AND READOUT LEAD (BARE WIRE).
7
REMOVE TWO SCREWS AND LIFT OFF COVER.
NOTE
WHEN ASSEMBLING MAKE SURE COVER CLIP MAKES CONTACT WITH SLIDE SWITCH CENTER PIN.
5
TILT BACK OF BOTTOM PROBE BODY HALF DOWN SLIGHTLY. THEN SLIDE BACK AWAY FROM PROBE TIP. (DON'T LOSE GND REF PUSHBUTTON).
1
REMOVE SNAP-FIT COVER.

PROBE TIP REMOVAL AND REPLACEMENT

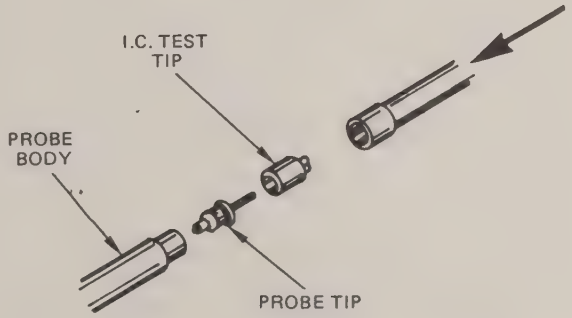


1

GRIP PROBE TIP BETWEEN PLASTIC AND GROUNDING SLEEVE WITH SHARP WIRE CUTTERS. DON'T SQUEEZE OR NICK GROUNDING SLEEVE.

2

PULL TIP FREE FROM GROUNDING SLEEVE WITH SIDEWAYS ROCKING MOTION.



1

ALIGN AS SHOWN AND PRESS INTO POSITION BY TAPPING SHARPLY WITH 3/16 INCH HOLLOW SHAFT NUT DRIVER (OR SIMILAR TOOL)

NOTES

SCHEMATIC AND REPLACEABLE PARTS

Parts Ordering Information

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

Item Name

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

Figure and Index Numbers

Items in this section are referenced by figure and index numbers to the illustrations.

Indentation System

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

```
''1 2 3 4 5          Name & Description
Assembly and/or Component
Attaching parts for Assembly and/or Component

    Detail Part of Assembly and/or Component
    Attaching parts for Detail Part

        Parts of Detail Part
        Attaching parts for Parts of Detail Part
```

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation.

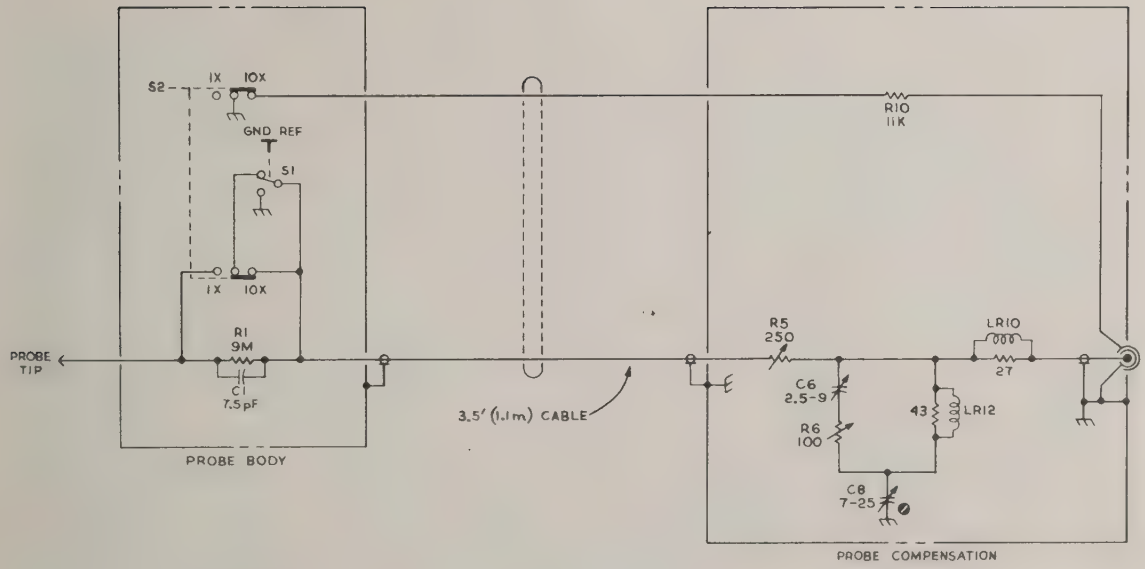
Attaching parts must be purchased separately, unless otherwise specified.

ABBREVIATIONS

ASSY	Assembly	COMP	Composition	IND	Indicator	STL	Steel
ATTEN	Attenuator	CONN	Connector	INSUL	Insulator	SUBASSY	Subassembly
BRS	Brass	DIA	Diameter	INTL	Internal	SW	Switch
BRZ	Bronze	DPDT	Two-pole double-throw	MT	Mount	TECH	Technical
BSHG	Bushing	ELEC	Electrical	OD	Outside diameter	VAR	Variable
CAP	Capacitor	FXD	Fixed	PL	Plate	V	Voltage
CER	Ceramic	GND	Ground	PLSTC	Plastic	W	With
CKT	Circuit	IC	Integrated circuit	PNH	Pan head		
COMP	Compensator	ID	Inside diameter	RET	Retractable		

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR. CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
01121	ALLEN-BRADLEY CO.	1201 2ND ST. SOUTH	MILWAUKEE, WI 53204
72982	ERIE TECHNOLOGICAL PRODUCTS INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC.,HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OHIO 45206
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60126
80009	TEKTRONIX, INC.	P. O. BOX 500	BEAVERTON, OREGON 97005
80294	BOURNS, INC., INSTRUMENT DIV.	6135 MAGNOLIA AVE.	RIVERSIDE, CA 92506
83385	CENTRAL SCREW CO.	2530 CRESCENT DRIVE	BROADVIEW, IL 60153


S2
1X
10X
GND REF
S1
1X
10X
R1
9M
C1
7.5pF
PROBE TIP
PROBE BODY
3.5' (1.1m) CABLE
R10
11K
R5
250
C6
2.5-9
R6
100
C8
7-25
43
LR12
LR10
27
PROBE COMPENSATION

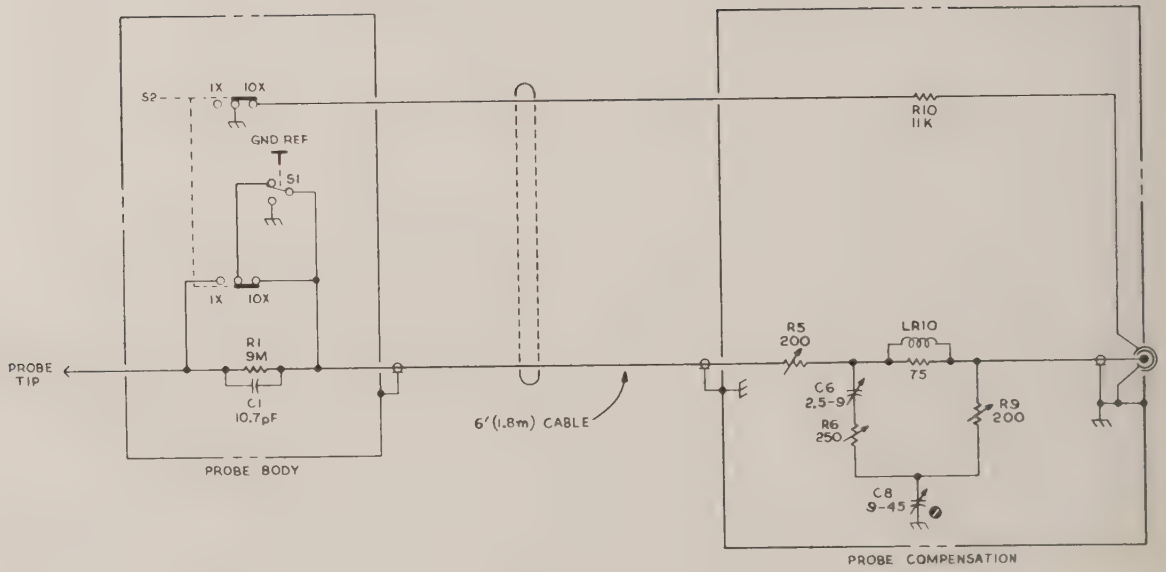

S2
1X
10X
GND REF
S1
1X
10X
R1
9M
C1
10.7pF
PROBE
TIP
PROBE BODY
6' (1.8m) CABLE
R10
11K
R5
200
LR10
75
C6
2.5-9
R6
250
R9
200
C8
9-45
PROBE COMPENSATION

FIG. 5 P6063A PROBE AND STANDARD ACCESSORIES

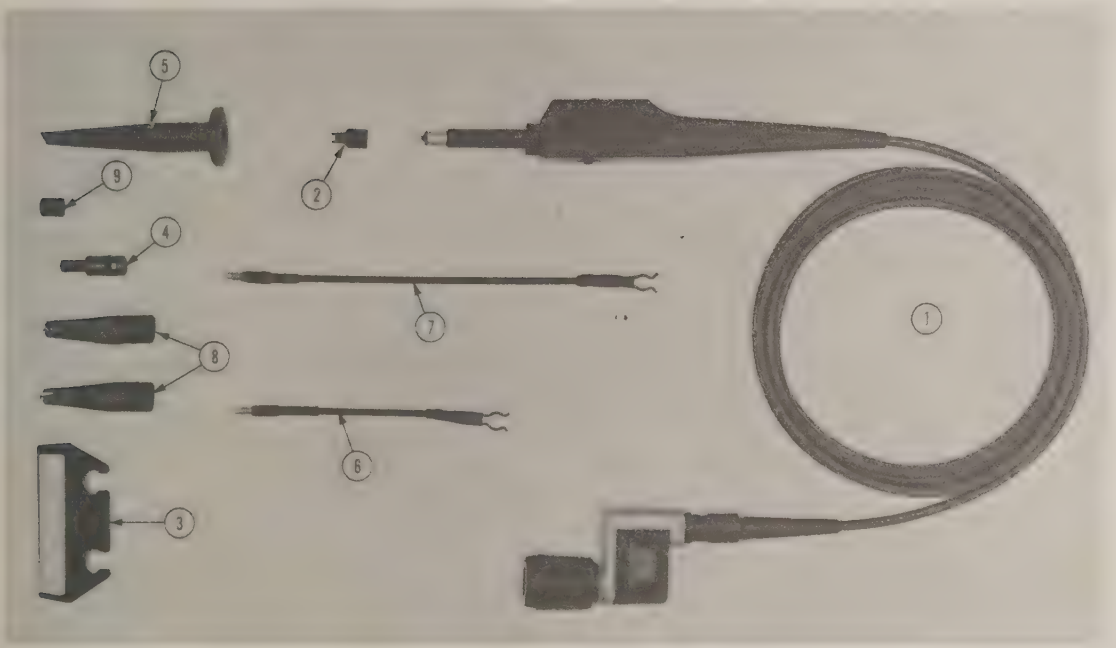


FIG. 5 P6063A PROBE AND STANDARD ACCESSORIES

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
-	P6063A			1		PROBE PACKAGE:P6063A,6 FOOT	80009	P6063A
	P6063A, OPT 1			1		PROBE PACKAGE:P6063A,3.5 FOOT	80009	P6063A, OPT 1
	----- -----			-		. PROBE PACKAGE INCLUDES:		
-1	010-6063-02			1		. PROBE:P6063A,6 FOOT	80009	010-6063-02
	010-6063-00			1		. PROBE:P6063A,3.5 FOOT	80009	010-6063-00
-2	015-0201-00 [1]			1		. . TIP PROBE:IC TEST (INCLUDED W/PROBE)	80009	015-0201-00
	070-1672-00			1		. . MANUAL,TECH (INCLUDED W/PROBE)	80009	070-1672-00
-3	352-0351-00			1		. HOLDER PROBE:	80009	352-0351-00
-4	206-0114-00			1		. TIP PROBE:	80009	206-0114-00
-5	013-0107-03			1		. TIP PROBE:RET HOOK ASSY	80009	013-0107-03
-6	175-0263-01			1		. LEAD,ELEC:PROBE GND,3 INCHES LONG	80009	175-0263-01
-7	175-0124-01			1		. LEAD,ELEC:PROBE GND,5 INCHES LONG	80009	175-0124-01
-8	344-0046-00			2		. CLIP,ELEC:ALLIGATOR TYPE,W/COVER	80009	344-0046-00
-9	166-0404-01			1		. SLEEVE,INSUL:FOR 0.188 DIA PROBE BSHG	80009	166-0404-01
	016-0521-00			1		. POUCH,ACCESSORY	80009	016-0521-00
	062-1675-00			1		. PROBE CARD	80009	062-1675-00

[1] Available in packs of 10, PN 015-0201-01 only, or 100, PN 015-0201-02 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
			010-6063-02 (6 FT.)			
C1[1]						
C6	281-0122-00			CAP.,VAR,CER DI:2.5-9PF,100V	72982	518-000A2.5-9
C8	281-0167-00			CAP.,VAR,CER DI:9-45PF,200V	72982	538-011D15-45
LR10	108-0602-00			COIL,RF:60NH	80009	108-0602-00
R1[1]						
R5	311-0605-01			RES.,VAR,NONWIR:200 OHM,10%,0.50W	73138	89P-3-0-201K
R6	311-0978-01			RES.,VAR,NONWIR:250 OHM	80009	311-0978-01
R9	311-0605-01			RES.,VAR,NONWIR:200 OHM,10%,0.50W	73138	89P-3-0-201K
R10	317-0113-00			RES.,FXD,COMP:11K OHM,5%,0.125W	01121	BB1135
S1[3]				SWITCH,PUSH		
S2	260-1470-01			SWITCH,SLIDE:W/CONTACTS	80009	260-1470-01
			010-6063-00 (3.50 FT.)			
C1[2]						
C6	281-0122-00			CAP.,VAR,CER DI:2.5-9PF,100V	72982	518-000A2.5-9
C8	281-0160-00			CAP.,VAR,CER DI:7-25PF,350V	72982	538-01187-25

[1]Available as assembly 206-0212-00
[2]Available as assembly 206-0210-00
[3]Consists of 260-1470-01, 131-1532-00 and 366-1529-00

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
LR10	108-0601-00			COIL,RF:60NH	80009	108-0601-00
LR12	108-0628-00			COIL,RF:290NH	80009	108-0628-00
R1[2]						
R5	311-0978-01			RES.,VAR,NONWIR:250 OHM,10%,0.50W	80009	311-0978-01
R6	311-0622-01			RES.,VAR,NONWIR:100 OHM,10%,0.50W	80294	3329HH76-101
R10	317-0113-00			RES.,FXD,COMP:11K OHM,5%,0.125W	01121	BB1135
S1[3]				SWITCH,PUSH		
S2	260-1470-01			SWITCH,SLIDE:W/CONTACTS	80009	260-1470-01

[2]Available as assembly 206-0210-00
[3]Consists of 260-1470-01, 131-1532-00 and 366-1529-00

FIG. 6 EXPLODED

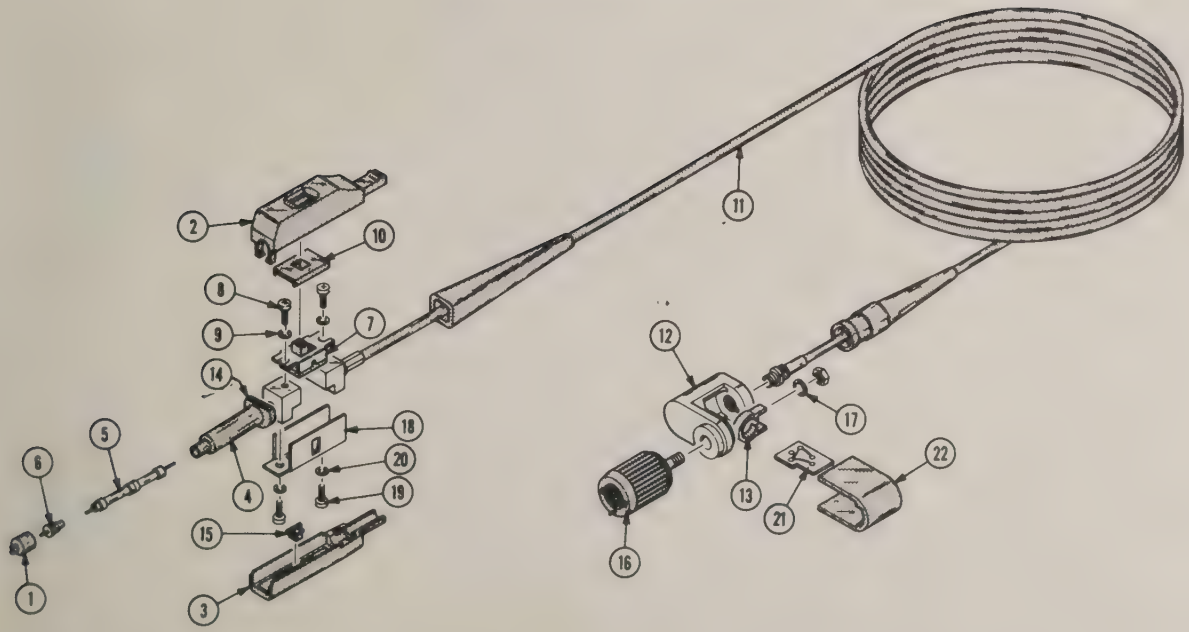


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
	010-6063-02			1	PROBE:P6063A,6 FOOT	80009	010-6063-02
	010-6063-00			1	PROBE:P6063A,3.5 FOOT	80009	010-6063-00
	----- -----			-	PROBE INCLUDES:		
-1	015-0201-00 [1]			1	PROBE TIP:IC TEST	80009	015-0201-00
-2	204-0595-00			1	BODY HALF,PROBE:TOP	80009	204-0595-00
-3	204-0596-02			1	BODY HALF,PROBE:BOTTOM	80009	204-0596-02
-4	204-0598-00			1	BODY PROBE:	80009	204-0598-00
-5	206-0212-00			1	ATTEN SUBASSY:PROBE SERIES 1X-10X (6 FT)	80009	206-0212-00
	206-0210-00			1	ATTEN SUBASSY:PROBE SERIES 1X-10X (3.5 FT)	80009	206-0210-00
	----- -----			-	EACH ATTEN SUBASSY INCLUDES:		
-6	206-0191-00			1	TIP,PROBE:	80009	206-0191-00
-7	260-1470-01			1	SWITCH,SLIDE DPDT:0.5A,125VAC,CKT BOARD MT	80009	260-1470-01
					(ATTACHING PARTS)		
-8	211-0136-00			2	SCREW,MACHINE:2-56 X 0.094 INCH,PNH STL	73743	OBD
-9	210-0001-00			2	WASHER,LOCK:INTL,0.092 ID X 0.18 OD,STL	78189	1202-00-00-0541C
					- - - * - - -		
-10	214-2041-00			1	IND.SW POSITION:	80009	214-2041-00
-11	175-1507-00			1	CABLE ASSY,ELEC:6 FOOT	80009	175-1507-00
	175-1499-00			1	CABLE ASSY,ELEC:3.50 FT.	80009	175-1499-00
-12	426-0690-04			1	FRAME,COMP BOX:	80009	426-0690-04
-13	354-0396-00			1	RING,CAP.MTG:	80009	354-0396-00
-14	343-0447-00			1	COLLAR,GND CLIP:MOLD PLSTC	80009	343-0447-00
-15	366-1529-00			1	PUSH BUTTON:PROBE	80009	366-1529-00
-16	131-1070-00			1	CONN.PLUG,FLEC:BNC	80009	131-1070-00
					(ATTACHING PARTS)		
-17	210-0056-00			1	WASHER,LOCK:SPLIT,0.047 ID X 0.32 OD,PH BRZ	83385	OBD
	220-0572-00			1	NUT,PLAIN,HEX:10-32 X 0.32 OD,PH BRS	73743	OBD
					- - - * - - -		

[1] Available in packs of 10, PN 015-0201-01 only, or 100, PN 015-0201-02 only.

Mechanical Parts List—P6063A Probe

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
-18	131-1532-00			1		CONTACT,ELEC:	80009	131-1532-00
						(ATTACHING PARTS)		
-19	211-0136-00			2		SCREW,MACHINE:2-56 X 0.094 INCH,PNH STL	73743	OBD
-20	210-0001-00			2		WASHER,LOCK:INTL,0.092 ID X 0.18 OD,STL	78189	1202-00-00-0541C
						- - - * - - -		
-21	670-3260-00			1		CKT BOARD ASSY:6 FOOT PROBE	80009	670-3260-00
	670-3259-00			1		CKT BOARD ASSY:3.5 FOOT PROBE	80009	670-3259-00
-22	200-1158-15			1		COVER,COMP BOX:6 FOOT PROBE	80009	200-1158-15
	200-1158-17			1		COVER,COMP BOX:3.5 FOOT PROBE	80009	200-1158-17
	070-1672-00			1		MANUAL,TECH:(NOT SHOWN)	80009	070-1672-00

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